Claims

We claim:

1. A method for registering an image with a 3D physical object, comprising:

acquiring a 3D graphics model of the 3D physical object;

identifying a plurality of 3D calibration points on a surface of the object and corresponding 3D model calibration points in the 3D graphics model;

illuminating the object with a calibration image using a projector at a fixed location;

aligning the calibration image with each of the 3D calibration points on the surface of the 3D physical object to identify corresponding 2D calibration pixels in the calibration image; and

determining a transformation between the 2D calibration pixels and the corresponding 3D calibration points of th3 model to register the projector with the 3D physical object.

2. The method of claim 1 further comprising:

rendering the 3D graphics model using the transformation to generate an image; and

illuminating the 3D physical object with the image using the projector at the fixed location.

3. The method of claim 1 including at least six 3D calibration points.

4. The method of claim 1 wherein the transformation includes a projector transformation matrix and a viewer transformation matrix.

5. The method of claim 1 wherein the calibration image includes a cross-hair, and further comprising:

aligning the cross-hair with the 3D calibration points using an input device couple to the projector.

6. The method of claim 1 further comprising:

illuminating the object with a plurality of calibration images using a plurality of projectors at a plurality of corresponding fixed locations;

aligning each calibration image with each of the 3D calibration points on the surface of the 3D physical object to identify corresponding 2D pixels in each calibration image;

determining a transformation between the 2D calibration pixels of each image and the corresponding 3D model calibration points to register each projector with the 3D physical object.

7. The method of claim 6 further comprising:

rendering the 3D graphics model using each transformation to generate a plurality of images; and

illuminating the 3D physical object with the image in parallel using the plurality of projector at the plurality of fixed location.